A Matlab Demo for Signal Filtering in Frequency Domain

Project Description

Part of signal valuable information is embedded in the frequency domain. Discrete Fourier transform is one of the representations that could help in analyzing the signal in the frequency domain (spectrum). Some filters are more convenient to be applied in frequency domain rather than time domain, like: low, high and band pass filters. In this project you are going to apply discrete Fourier transform, inverse discrete Fourier transform and frequency filtering on different signals.

Data

You are required to apply the demo on three type of signals:

1) Reordered speech signal (saying your group number).
2) Sawtooth signal.
3) ECG signal (from your statistics project).

Tools and Software

You are allowed to use any programming language (c, c++, Java, Python, Matlab… etc.) (Matlab is recommended) and any operating system (Windows, Linux or Mac).

Deliverables

- A functional GUI demo (fig.1 shows an example for the gui) includes but not limited to these features:
    - Three buttons to load different signal types and plot it.
    - A button to calculate the DFT of the loaded signal and plot it in normalized axes ($0 : 2\pi$ or $-\pi : \pi$).
    - Ability to select two frequencies on the DFT plot using the mouse and mark them, then pad the range between these frequencies as shown in fig.1.
    - A button to calculate the inverse DFT for the padded DFT and plot it.

Useful functions (Matlab)

You may find these Matlab functions useful: fft, ifft, nextpow2, angle and ginput.

Useful resources for Matlab GUI

- Link1
- Link2

Delivery Week: Tuesday 22/3/2016 till Tuesday 29/3/2016.

Delivery Form

Each group should deliver a compressed file to **m.elbially@gmail.com**.

The name of the compressed file will be in the following format:

- DSP-Project01-GroupNumber-"your group number".
  for example (DSP-Project01-GroupNumber-10).
- Compressed file should include two files:
  - DSP-Project01-GroupNumber-"your group number".m
  - DSP-Project01-GroupNumber-"your group number".fig

The mail subject will be in the following format:

- [Bio2017] DSP-Project01-GroupNumber-"your group number"
  for example ([Bio2017] DSP-Project01-GroupNumber-10).

P.S.

- Any extra features will be bounced.
- Your demo should be totally functional and free of bugs before delivery.
- Any cheating will fetch you zero.
- You can deliver the project after the delivery week with -10% for every week delay.
- Team members will be graded equally with the average of the group.
- Not following the naming convention of the files and/or mail subject will penalize your group by 5%.

Best Regards.

DSP : Project #1

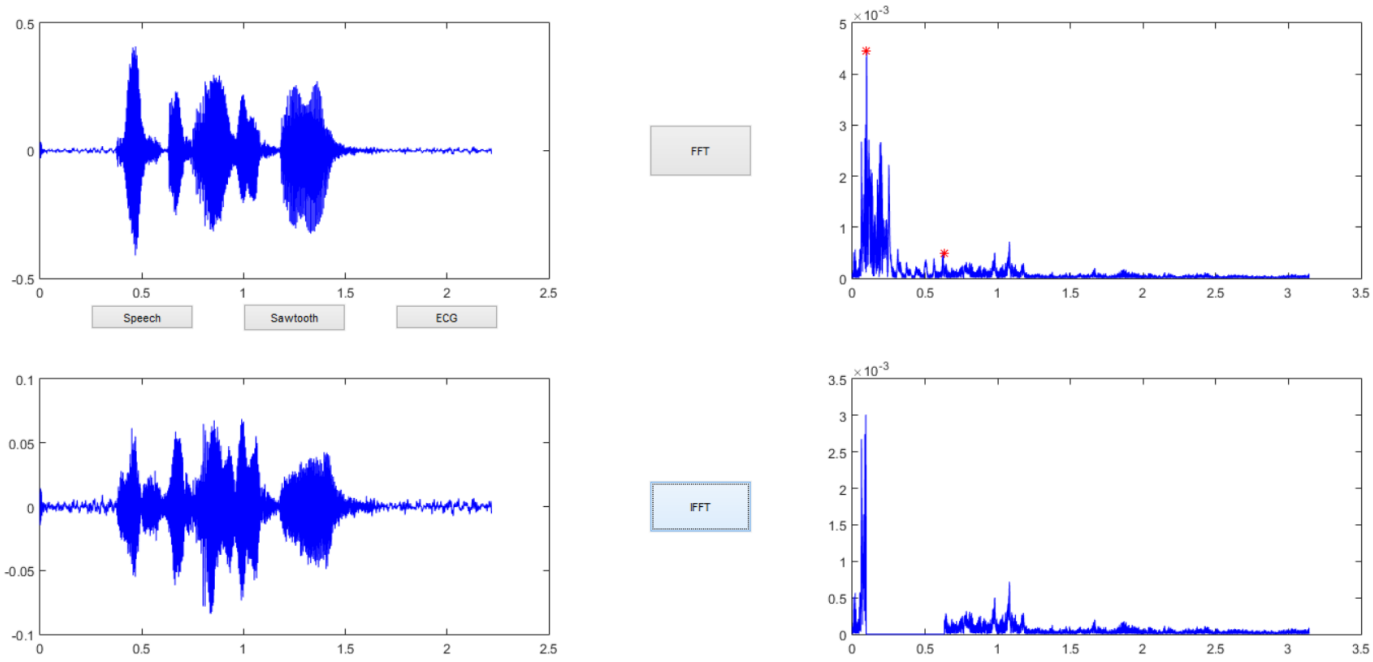

Figure 1. Example for a demo contains the required features